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Project No. 23512
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***Tank Farm Soil and Groundwater Field
Sampling Plan for the Operable Unit 3-14
Remedial Investigation/Feasibility Study (Draft)***

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December 2003

**Prepared for the
U.S. Department of Energy
Idaho Operations Office**

ABSTRACT

This Waste Area Group 3, Operable Unit 3-14, Field Sampling Plan describes Phase I and Phase II Tank Farm Soil characterization activities that will be performed for the Operable Unit 3-14 remedial investigation/feasibility study of the Idaho Nuclear Technology and Engineering Center (INTEC) Tank Farm. INTEC is located at the Idaho National Engineering and Environmental Laboratory (INEEL), a government-owned facility managed by the U. S. Department of Energy.

Historically, INTEC served as a nuclear fuel reprocessing facility, a research facility, and a facility for storage of spent nuclear fuel. Liquid waste generated from the reprocessing activities was stored in the Tank Farm, which consists of 11 underground stainless-steel tanks (300,000-gal each), each contained within a vault, and four underground inactive tanks (30,000-gal each) resting on concrete pads. Currently, INTEC manages the treatment and storage of solidified (calcined) high-level waste generated during past spent nuclear fuel reprocessing and also low-level waste generated from past and ongoing operations and cleanup activities at the INEEL.

The Tank Farm soil has been contaminated by radioactive liquids due to spills and pipeline leaks from plant and transfer operations. Several known high-level and low-level radioactive contamination areas exist at varying locations and depths throughout the Tank Farm subsurface. No evidence has been found to indicate that any of the tanks themselves have leaked. Characterization of the Tank Farm soil will take place in two phases, as detailed in this Field Sampling Plan.

The purpose of the Phase I field investigation is to define the extent and distribution of radionuclide, organic, and inorganic chemical contamination in the subsurface for known release sites. Subsurface radiation logging will be conducted in existing and new probeholes. New probeholes will be installed and surveyed for gamma radiation at sites Chemical Processing Plant (CPP)-15 and CPP-79 Deep. Locations for new probeholes have been proposed using best judgment based on the location of known release sites and whether the extent and distribution of contamination has been delineated at those sites. The subsurface gamma radiation surveys will be used to produce log plots showing variations in gamma-ray flux at depth. Correlation between log plots will be used as a basis to estimate the combined horizontal and vertical extent of soil contamination zones.

Phase II of the characterization effort will involve collecting and analyzing soil samples for specified contaminants of potential concern. Soil samples will be collected at release sites CPP-15, CPP-28, CPP-31, and CPP-79 Deep. The specific sample locations are to be determined based on results of the subsurface gamma radiation survey completed during Phase I field activities.

CONTENTS

ABSTRACT.....	iii
ACRONYMS.....	ix
1. INTRODUCTION.....	1-1
1.1 Purpose and Objectives	1-1
1.2 Health and Safety Plan	1-3
1.3 Project Organization and Responsibilities.....	1-3
2. SITE DESCRIPTION AND BACKGROUND.....	2-1
3. FIELD SAMPLING PLAN OBJECTIVES	3-1
3.1 Data Needs	3-1
3.2 Sampling Methods.....	3-1
3.3 Quality Assurance Objectives	3-2
3.3.1 Project Quality Objectives	3-2
3.3.2 Precision.....	3-2
3.3.3 Accuracy	3-2
3.3.4 Completeness	3-3
3.3.5 Representativeness	3-3
3.3.6 Comparability.....	3-4
3.3.7 Field Data Reduction.....	3-4
3.3.8 Data Validation	3-4
3.3.9 Quality Assurance Objectives for Measurement.....	3-4
4. CHARACTERIZATION METHODS	4-1
4.1 Phase I Downhole Radiation Logging.....	4-1
4.2 Phase I Pre-Drilling Using the Vacuum Excavator	4-1
4.3 Phase I Direct-Push Drilling in Tank Farm Soil.....	4-5
4.3.1 Direct-Push Equipment	4-6
4.3.2 Direct-Probehole Installation	4-7
4.4 Phase I Hand Augering.....	4-7
4.5 Phase II Soil Sampling	4-8
4.5.1 Soil Sampling Procedure.....	4-8
4.5.2 Quality Control Samples	4-9

4.5.3	Field Decontamination Procedures	4-9
4.5.4	Sample Screening, Packaging and Shipping	4-10
4.6	Phase II Sample Collection for Treatability Studies	4-10
5.	MEASUREMENT METHODS	5-1
5.1	Phase I Subsurface Gross Gamma Radiation Logging	5-1
5.1.1	Site Survey	5-1
5.1.2	Mobilize Survey Instrument	5-1
5.1.3	Calibrate Instrument	5-1
5.1.4	Conduct Field Survey	5-2
5.1.5	Processing, Analysis, and Final Report	5-2
5.2	Laboratory Analytical Methods for Phase II Soil Samples	5-2
5.2.1	Analytical methods and procedures	5-2
6.	PERSONAL PROTECTIVE EQUIPMENT, EQUIPMENT DECONTAMINATION, AND WASTE MANAGEMENT PROCEDURES	6-1
6.1	Personal Protective Equipment	6-1
6.2	Direct-Push and Hand Augering Equipment	6-1
6.3	Vacuum Excavation Equipment	6-1
6.4	Management of Sampling Waste	6-2
6.4.1	Waste Management	6-2
7.	DOCUMENT MANAGEMENT AND SAMPLE CONTROL	7-1
7.1	Documentation	7-1
7.1.1	Sample Container Labels	7-1
7.1.2	Field Guidance Form	7-1
7.1.3	Field Logbooks	7-1
7.2	Sample Handling	7-2
7.2.1	Sample Preservation	7-2
7.2.2	Chain of Custody Procedures	7-3
7.2.3	Transportation of Samples	7-3
7.3	Document Action Requests	7-3
8.	REFERENCES	8-1
	Appendix A—Operable Unit 3-14 Release Sites with Existing and Proposed Probehole Locations	A-1

FIGURES

1-1. Map of the Idaho Nuclear Technology and Engineering Center at the Idaho National Engineering and Environmental Laboratory, showing the tank farm (topography adapted from United States Geological Survey [USGS] Circular Butte 3SW, contour interval 10 ft, scale 1:24000).....	1-2
4-1. Proposed locations for probeholes at release site CPP-15	4-2
4-2. Proposed locations for probeholes at release site CPP-79 Deep.....	4-3
4-3. Schematic of probehole installation.....	4-4

TABLES

3-1. Completeness goals for Operable Unit 3-14 Tank Farm soil investigation	3-3
4-1. Location and investigation strategy of proposed Phase I probeholes	4-1
4-2. Investigation strategy for release sites requiring Phase II soil sampling	4-8
5-1. Contaminants of potential concern to be analyzed for and required analytical methods.....	5-3
5-2. Sample containers, preservation, minimum volume, and holding time requirements	5-4

ACRONYMS

ALARA	as low as reasonably achievable
BBWI	Bechtel BWXT Idaho, LLC
CFR	Code of Federal Regulations
COC	chain of custody
COPC	contaminant of potential concern
CPP	Chemical Processing Plant (ICPP)
Cs	cesium
DOT	U.S. Department of Transportation
DQO	data quality objective
EPA	Environmental Protection Agency
ER	environmental restoration
FSP	Field Sampling Plan
FTL	field team leader
HASP	Health and Safety Plan
ICPP	Idaho Chemical Processing Plant
ID	inside diameter
IDW	investigation-derived waste
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
MCP	management control procedure
OD	outside diameter
OU	operable unit
PPE	personal protective equipment
PRD	program requirements document
QA	quality assurance

QAPjP	Quality Assurance Project Plan
QC	quality control
RadCon	Radiological Control
RCT	radiological control technician
RI/FS	remedial investigation/feasibility study
RWP	radiological work permit
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
SVOC	semivolatile organic compound
VOC	volatile organic compound
WAG	waste area group

Tank Farm Soil and Groundwater Field Sampling Plan for the Operable Unit 3-14 Remedial Investigation/Feasibility Study (Draft)

1. INTRODUCTION

This Waste Area Group (WAG) 3, Operable Unit (OU) 3-14 Field Sampling Plan (FSP) describes the Phase I and II Tank Farm soil characterization investigation activities that will be performed in support of the “Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan (Draft)” (DOE-ID 2003). This FSP also describes the details, processes, and programs that will be used to ensure that the data generated are suitable for their intended uses. In accordance with the *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory* (DOE-ID 1991), this FSP is one part of a two-part Sampling and Analysis Plan (SAP). The second part of the SAP is a Quality Assurance Project Plan (QAPjP). The governing QAPjP for this sampling effort is the *Quality Assurance Project Plan for WAGs 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites* (DOE-ID 2002). The field sampling activities also will be conducted in accordance with the “Project Execution Plan for the Balance of INEEL Cleanup Project” (PLN-694, 2003), which, along with the QAPjP, establishes the quality requirements for activities within the Idaho National Engineering and Environmental Laboratory (INEEL) concerning the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

These plans have been prepared pursuant to the “National Oil and Hazardous Substances Pollution Contingency Plan” (40 Code of Federal Regulations [CFR] 300), and guidance from the U.S. Environmental Protection Agency (EPA) for the preparation of SAPs (EPA 1988).

1.1 Purpose and Objectives

The purpose of this FSP is (a) to guide the collection of environmental data in order to fully characterize the extent, distribution, and composition of contamination in soils located at identified release sites at the Idaho Nuclear Technology and Engineering Center (INTEC) Tank Farm, and (b) to support the selection of a remedial alternative. A map indicating locations of the INTEC at the INEEL, and the Tank Farm within the INTEC, is provided in Figure 1-1.

This investigation involves a two-phase approach to focus project resources on maximizing information gained in the field to define radiological hotspots while minimizing unnecessary sampling and characterization efforts. The overall objective of this field characterization is to provide technical data to support the Baseline Risk Assessment and feasibility study phases of the OU 3-14 Remedial Investigation/Feasibility Study (RI/FS) (DOE-ID 2003).

The objectives of the Phase I field effort are as follows:

- Define the spatial extent and distribution of contaminants of potential concern (COPCs) at known release sites at concentrations above preliminary remediation goals (PRGs) for direct exposure to soils. All Tank Farm releases are known to have contained high concentrations of gamma-emitting radionuclides including Cesium-137 (hereafter referred to as Cs-137); therefore, the Phase I investigation will focus on determining the spatial extent and distribution (e.g., locations of hotspots) of gamma-emitting radionuclides. Gamma radiation will then serve as an indicator of zones where other COPCs are most likely to occur.

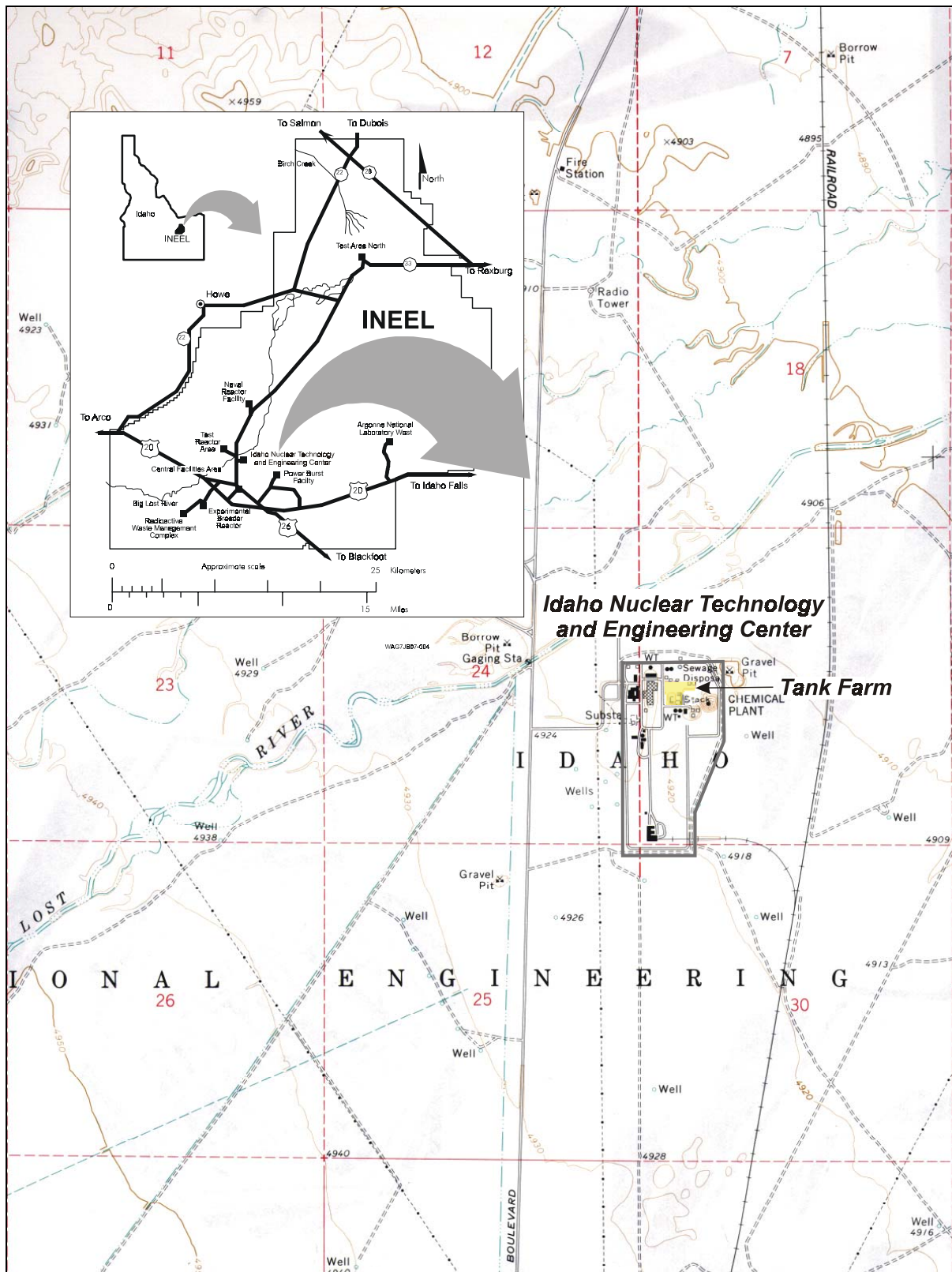


Figure 1-1. Map of the Idaho Nuclear Technology and Engineering Center at the Idaho National Engineering and Environmental Laboratory, showing the tank farm (topography adapted from United States Geological Survey [USGS] Circular Butte 3SW, contour interval 10 ft, scale 1:24000).

- Identify locations where soil samples will be collected during Phase II field activities based on the spatial extent and distribution of COPCs.

The objective of the Phase II field effort is as follows:

- Define the composition of radiological contamination at locations defined during the Phase I field effort.

The Tank Farm soil has been contaminated by radioactive liquids from past spills and pipeline leaks from plant and transfer operations. In addition to several known highly-contaminated areas, low levels of contamination are suspected to exist at varying locations and depths throughout the Tank Farm subsurface. Contaminant type, concentration, and a real extent of known spill volumes are incompletely characterized for some spill locations. According to the *Final Record of Decision, Idaho Nuclear Technology and Engineering Center, Operable Unit 3-13* (DOE-ID 1999), the principal threats posed by contaminated Tank Farm soil are external radiation exposure, and contamination of underlying perched groundwater and the Snake River Plain Aquifer.

The Tank Farm soil is defined as soil from the surface to the uppermost underlying basalt flow. The Tank Farm soil sites were consolidated into Chemical Processing Plant (CPP)-96. CPP-96 includes release sites CPP-15, CPP-16, CPP-20, CPP-24, CPP-25, CPP-26, CPP-27, CPP-28, CPP-30, CPP-31, CPP-32E, CPP-32W, CPP-33, CPP-58, and CPP-79 (CPP-79 Shallow, CPP-79 Deep). The site map located in Appendix A illustrates the Tank Farm release sites.

1.2 Health and Safety Plan

The “Tank Farm Soil and Groundwater Health and Safety Plan for the Phase I Operable Unit 3-14 Remedial Investigation/Feasibility Study (Draft)” (INEEL 2003a) is the governing Health and Safety Plan (HASP) for this FSP. The HASP will be amended, as appropriate, through a document action request (DAR) before the commencement of any field activities.

1.3 Project Organization and Responsibilities

The project organizational structure reflects the personnel resources and expertise required for the completion of work activities discussed in this FSP, while concurrently achieving minimization of risks to worker health and safety. The organizational structure presented in the OU 3-14 HASP, Section 9, Figure 9-1 (INEEL 2003a), is current as of the time of writing this FSP and will be updated as required. Shown in Figure 9-1 are job titles, responsibility delineation, and communication chains for personnel who will be filling key roles at the work site.

2. SITE DESCRIPTION AND BACKGROUND

A current, detailed description of the site background of the INTEC Tank Farm, and a detailed account of the source, nature, and extent of contamination present at specific release sites at the INTEC Tank Farm are provided in the “Operable Unit 3-14 Tank Farm Soil and Groundwater Phase I Remedial Investigation/Feasibility Study Work Plan (Draft)” (DOE-ID 2003). The investigation logic for known release sites is also included in the Work Plan.

3. FIELD SAMPLING PLAN OBJECTIVES

This FSP focuses on obtaining data that will address issues pertaining to Tank Farm soil contamination, and is based on findings documented in the OU 3-13 Remedial Investigation/Feasibility Study (RI/FS) report (DOE-ID 1997). These guiding documents specify the need to assess the potential for groundwater contamination originating from contaminated soil within the Tank Farm fence. This FSP requires the following data collection and analysis efforts to resolve Baseline Risk Assessment and feasibility study data gaps identified in the OU 3-14 RI/FS Work Plan (DOE-ID 2003):

- **Phase I**
 - **Subsurface Gamma Radiation Survey:** Assess the extent of subsurface radionuclide contamination within the Tank Farm soil investigation area, utilizing both existing probeholes and new probeholes to be installed at proposed locations for release sites CPP-15 and CPP-79 Deep.
- **Phase II**
 - **Direct-Push Soil Sampling:** Assess the composition of contaminants at sites CPP-15, CPP-28, CPP-31, and CPP-79 Deep from sample locations defined during Phase I characterization efforts by collecting soil samples using direct-push technology.

This FSP addresses data needs developed using the EPA data quality objective (DQO) process. The principal study questions (PSQs) pursuant to OU 3-14 Tank Farm Soil DQOs are discussed in the OU 3-14 RI/FS Work Plan (DOE-ID 2003). Two separate field activity phases are planned to fully address the PSQs. Phase I activities will provide information on the spatial extent and distribution of radionuclide contamination within the Tank Farm soil utilizing subsurface gamma ray detection methods. Phase II activities will define the composition of contaminants. This two-phased approach is recommended for most efficiently allocating resources and resolving data needs.

3.1 Data Needs

Specific data needs for sampling activities were developed using the Data Quality Objectives (DQO) process as discussed in Section 5 of the Work Plan (DOE-ID 2003). Phase I sampling will focus on detecting and mapping the subsurface distribution of gamma-ray emitting radionuclides at known release sites in the Tank Farm soil. Phase II will focus on identifying the composition of contaminants at locations identified during the Phase I investigation. Cs-137 soil contamination is expected to be the principal source of the mapped radiation fields, as it has been found in all contamination zones discovered in the Tank Farm to date. It is a universal constituent of processed waste streams in past and present Tank Farm operations, and is easily detected at low concentrations (<10 pCi/g). Anomalous gamma-radiation areas, most likely associated with Cs-137 contamination, will then serve as an indicator of contamination zones where other analytes of concern are most likely to occur.

3.2 Sampling Methods

Phase I downhole in situ radiation measurements will be used to detect gamma-ray emitters. Cs-137 will be the predominant gamma-ray emitter and will serve as an indicator to direct Phase II sampling for additional analytes of concern in specific areas of interest.

The planned subsurface small diameter logging system will consist of a gamma-ray sonde that is capable of detecting the 662 keV gamma ray emitted by Cs-137 through steel casing to a minimum detection level of 3 pCi/g. This system and its capabilities are discussed in detail in Sections 4.2 of this FSP.

Phase II soil sampling will be completed using direct-push technology as outlined in Sections 4.5 and 6.2 of this FSP.

3.3 Quality Assurance Objectives

The *Quality Assurance Project Plan for WAGs 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites* (DOE-ID 2002), referred to as the QAPjP, pertains to quality assurance (QA) and quality control (QC) for all environmental, geotechnical, geophysical, and radiological testing, analysis, and data review. Specific requirements to support the OU 3-14 field investigation, including QA/QC requirements for all sample and analyte types that may potentially be collected, are discussed below.

3.3.1 Project Quality Objectives

The QA objectives specify which measurements must be obtained to produce acceptable data for a project. The technical and statistical qualities of these measurements must be properly documented. Precision, accuracy, and completeness are quantitative parameters that must be specified for physical or chemical measurements. Representativeness and comparability are qualitative parameters.

The QA objectives for this project will be met through a combination of field and laboratory checks. Field checks will consist of collecting field duplicates, equipment blanks, and field blanks as appropriate. Laboratory checks consist of initial and continuing calibration samples, laboratory control samples, matrix spikes, and matrix spike duplicates. Laboratory QA is detailed in the QAPjP (DOE-ID 2002).

3.3.2 Precision

Field precision is a measure of the variability not caused by laboratory or analytical methods. The three types of field variability or heterogeneity are spatially within a data population, between individual samples and within an individual sample. Though the heterogeneity between and within samples can be evaluated using duplicate samples or sample splits as appropriate, overall field precision will be calculated as the relative percent difference (RPD) between two measurements, or the relative standard deviation (RSD) between three or more measurements as appropriate. The RPD or RSD will be calculated as indicated in the QAPjP (DOE-ID 2002) for duplicate samples during the data validation process. Precision goals are established for organic and inorganic Contract Laboratory Program (CLP) methods and for radioanalytical analyses in the QAPjP.

3.3.3 Accuracy

Cross-contamination of samples during collection or shipping could yield incorrect analytical results. To assess the occurrence of any cross-contamination events, field blanks will be collected as appropriate to evaluate any potential impacts as appropriate. The goal of the sampling program is to eliminate any cross-contamination associated with sample collection or shipping (DOE-ID 2002).

Accuracy of field instrumentation can be maintained by calibrating all instruments used to collect data and cross checking with other independently collected data. Accuracy goals are established for

organic and inorganic Contract Laboratory Program (CLP) methods and for radioanalytical analyses in the QAPjP (DOE-ID 2002).

3.3.4 Completeness

Overall completeness of the data collection effort is assessed by comparing the number of samples collected and analyzed to the number of samples planned (DOE-ID 2002). Field completeness compares the number of samples collected to the number of samples received at the analytical laboratory, while analytical completeness compares the number of samples received to the number of analyses performed. Field sampling completeness is affected by factors such as equipment and instrument malfunctions and insufficient sample recovery. Analytical completeness is affected if (a) samples are not analyzed within the defined holding time, (b) a sample is damaged during handling or storage, or (c) the laboratory data cannot be validated and the sample cannot be reanalyzed.

Completeness can be assessed following data validation and reduction. The completeness goals for critical and non-critical project elements are cited in Table 3-1 below. Critical samples are defined as those required to achieve project objectives or to set limits on decision errors (e.g., samples to assess compliance with a cleanup level), while non-critical samples are those required for secondary or supporting information (e.g., provide indications of trends over time). Critical vs. non-critical activities for the Phase I Tank Farm soil field investigation are defined in Table 3-1 below. Completeness goals for the Phase II Tank Farm soil investigation will be defined in the final version of this FSP.

Table 3-1. Completeness goals for Operable Unit 3-14 Tank Farm soil investigation.

Investigation Phase	Investigation Element	Sample Type(s)	Completeness Goal (%)
Phase I	Probehole installation	Critical	90
	Gamma logging probeholes	Non-critical	67

The completeness goal for probehole installation is 90% since probeholes will be used to establish the extent of contamination at specific release sites, which was identified as a data gap requiring deferral of the Tank Farm soils to OU 3-14 in the OU 3-13 Record of Decision (DOE-ID 1999). If a probehole cannot be installed at a specified location due to infrastructure constraints, or alternatively, at a nearby location that will still address the data gaps to be resolved by the original probehole as determined by the field team leader (FTL), then an alternate location will be identified or the location will be deleted.

The completeness goal for gamma logging each specified probehole interval is 0-67% (2 of 3 planned intervals maximum) since not each vertical interval will be required to establish extent of contamination, while 67% is believed to be an attainable percentage. Specifying less than 100% completeness allows for a limited number of problems to occur (hardware, operator, or other) without compromising the schedule.

3.3.5 Representativeness

Representativeness is evaluated by assessing the accuracy and precision of the sampling program and expressing the degree to which samples represent actual site conditions. In essence, representativeness is a qualitative parameter that addresses whether the sampling program was properly designed to meet the DQOs. The representativeness criterion is best satisfied by confirming that sampling locations are properly selected, and a sufficient number of samples are collected to meet the requirements stated in the DQOs.

3.3.6 Comparability

Comparability is a qualitative measure of the confidence with which one data set can be compared to another. These data sets include data generated by different laboratories performing the work, data generated by laboratories in previous studies, data generated by the same laboratory over a period of several years, or data obtained using different sampling techniques or analytical protocols. For field aspects of this program, data comparability will be achieved using standard methods of sample collection and handling.

3.3.7 Field Data Reduction

The reduction of field data is an important task to ensure that errors in sample labeling and documentation have not been made. This includes cross-referencing the SAP table presented in the FSP with sample labels, logbooks, and chain of custody (COC) forms. Prior to sample shipment to the laboratory, field personnel will ensure that all information is properly documented.

3.3.8 Data Validation

All laboratory-generated data will be validated to Level A. Data validation will be performed in accordance with Guide (GDE) -7003, "Levels of Analytical Method Data Validation." Field-generated data (e.g., downhole gamma readings and water levels) will be validated through the use of properly calibrated instrumentation, comparing and cross checking data with independently gathered data, and recording data collection activities in a bound field logbook.

3.3.9 Quality Assurance Objectives for Measurement

The QA objectives are specifications that the monitoring and sampling measurements identified in the QAPjP must meet to produce acceptable data for the project. The technical and statistical quality of these measurements must be properly documented. Precision, accuracy, method detection limits, and completeness must be specified for hydraulic and chemical measurements. Specific QA objectives are specified in the QAPjP (DOE-ID 2002).

4. CHARACTERIZATION METHODS

This section discusses the field methods designed for completion of the Phase I Downhole Radiation Logging, Phase I Pre-Drilling Using the Vacuum Excavator, Phase I Direct-Push Drilling, Phase I Hand Augering, and Phase II Soil Sampling.

4.1 Phase I Downhole Radiation Logging

The subsurface gamma ray survey will be performed within existing probeholes (see map in Appendix A) from ground surface to total depth, and in new borehole locations to be installed at sites CPP-15 and CPP-79 Deep (Table 4-1, Figures 4-1 and 4-2). Locations for new probeholes have been proposed using best judgment based on the locations of known release sites, information regarding whether the extent and distribution of radionuclide contamination were previously determined for that release site, and on infrastructure constraints. These proposed locations may be modified and/or new locations added during installation activities based on information gained while in the field. The subsurface gamma ray logging procedure is described in Section 5.

Table 4-1. Location and investigation strategy of proposed Phase I probeholes.

Release Site	HDR Name	Depth	Tooling	Investigation Strategy
CPP-15	ICPP-1866	To basalt	Vacuum Lance/Direct Push	Establish maximum depth, areal extent, and distribution of contamination.
	ICPP-1867	To basalt	Vacuum Lance/Direct Push	
	ICPP-1868	To basalt	Vacuum Lance/Direct Push	
	ICPP-1869	To basalt	Vacuum Lance/Direct Push	
CPP-79 Deep	ICPP-1884	To basalt	Vacuum Lance/Direct Push	Establish maximum depth, areal extent, and distribution of contamination.
	ICPP-1885	To basalt	Vacuum Lance/Direct Push	
	ICPP-1886	To basalt	Vacuum Lance/Direct Push	
	ICPP-1887	To basalt	Vacuum Lance/Direct Push	
	ICPP-1888	To basalt	Vacuum Lance/Direct Push	

CPP = Chemical Processing Plant (ICPP)
ICPP = Idaho Chemical Processing Plant
HDR = hydrogeologic data repository

The method detection level (MDL) for field screening measurements of Cs-137 gross gamma using the small diameter logging system identified for this project is 3 pCi/g. This MDL is based on the following assumptions:

- Gross gamma count time of 10 seconds per depth interval (generally 0.15-m [0.5-ft])
- Wall thickness of the steel casing is 0.31-in.

4.2 Phase I Pre-Drilling Using the Vacuum Excavator

New probeholes will be installed at sites CPP-15 and CPP-79 Deep (see Table 4-1 and Figures 4-1 and 4-2). The presence of buried pipes, valve boxes, and other infrastructure elements associated with past and present Tank Farm operations creates a substantial hazard for any invasive activities within the Tank Farm soil. If an infrastructure feature was struck by drilling or excavation equipment, a contaminant release could occur. Since the Tank Farm infrastructure occurs almost exclusively within the depth interval from 0 to 3.7 m (0 to 12 ft), probe and/or instrument installation through the upper soil zone may

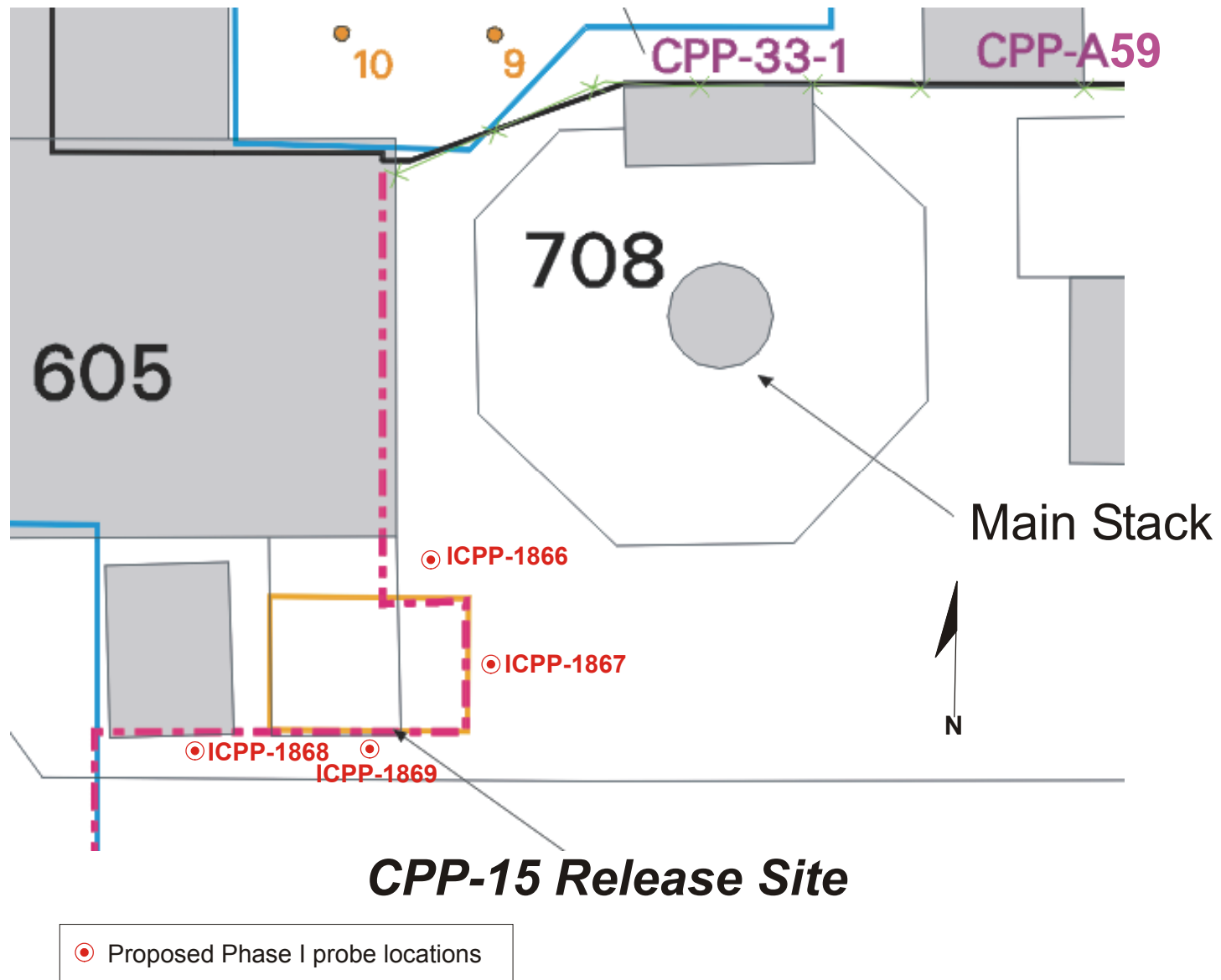
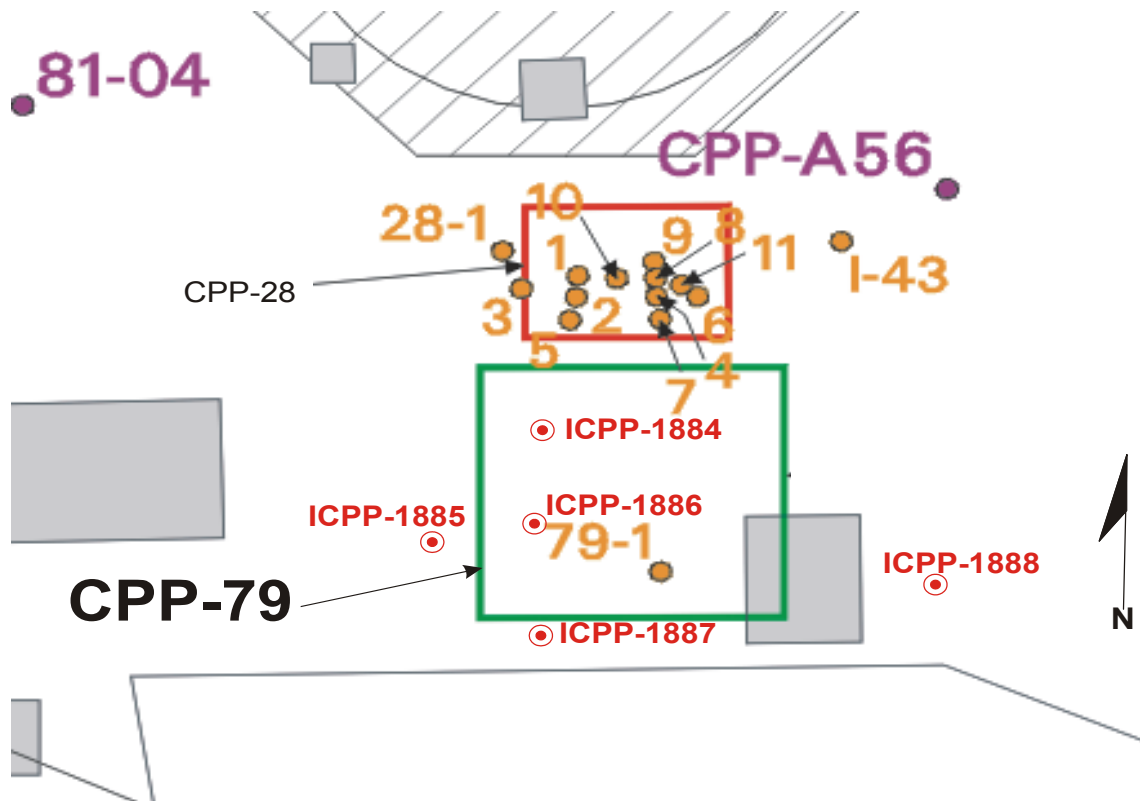


Figure 4-1. Proposed locations for probeholes at release site CPP-15.



CPP-79 Release Site

● Proposed Phase I probe locations

Figure 4-2. Proposed locations for probeholes at release site CPP-79 Deep.

be accomplished using a vacuum excavation system to prevent damage to the infrastructure. If the vacuum excavation technique proves impractical because of radiological concerns, then pilot borings may be completed using a hand auger.

Vacuum excavation technology involves the use of a high-pressure jet of air, directed by a nozzle called an air lance, to penetrate, expand, and break up soil. Soil material, including rock and debris, is removed by a 4-in.-diameter vacuum hose to a drum or similar receptacle (anticipated to be 35- or 55-gal). This process is a closed loop system, thereby reducing the risk of an air release. Vacuum excavation advances the probehole without damaging underground pipelines or utilities.

The vacuum excavator may be used to excavate a pilot hole 7.6 to 12.7 cm (3 to 5 in.) in diameter to a depth of 4.6 m (15 ft) below land surface (bls). A schematic of the probehole installation is shown in Figure 4-3. If subsurface piping or other infrastructure is encountered, the probehole location will be abandoned in favor of a new location at a nearby position, unless the probehole casing can be placed safely adjacent to the obstacle. Soil will be excavated in 1.5-m (5-ft) increments (0 to 1.5 m [0 to 5 ft], 1.5 to 3 m [5 to 10 ft], 3 to 4.5 m [10 to 15 ft]), and stored temporarily in drums labeled according to hole position and depth range. If the vacuum-lanced boring will not stay open, schedule 40 polyvinyl chloride (PVC) casing may be inserted to maintain an open hole temporarily until the direct-push tooling is installed.

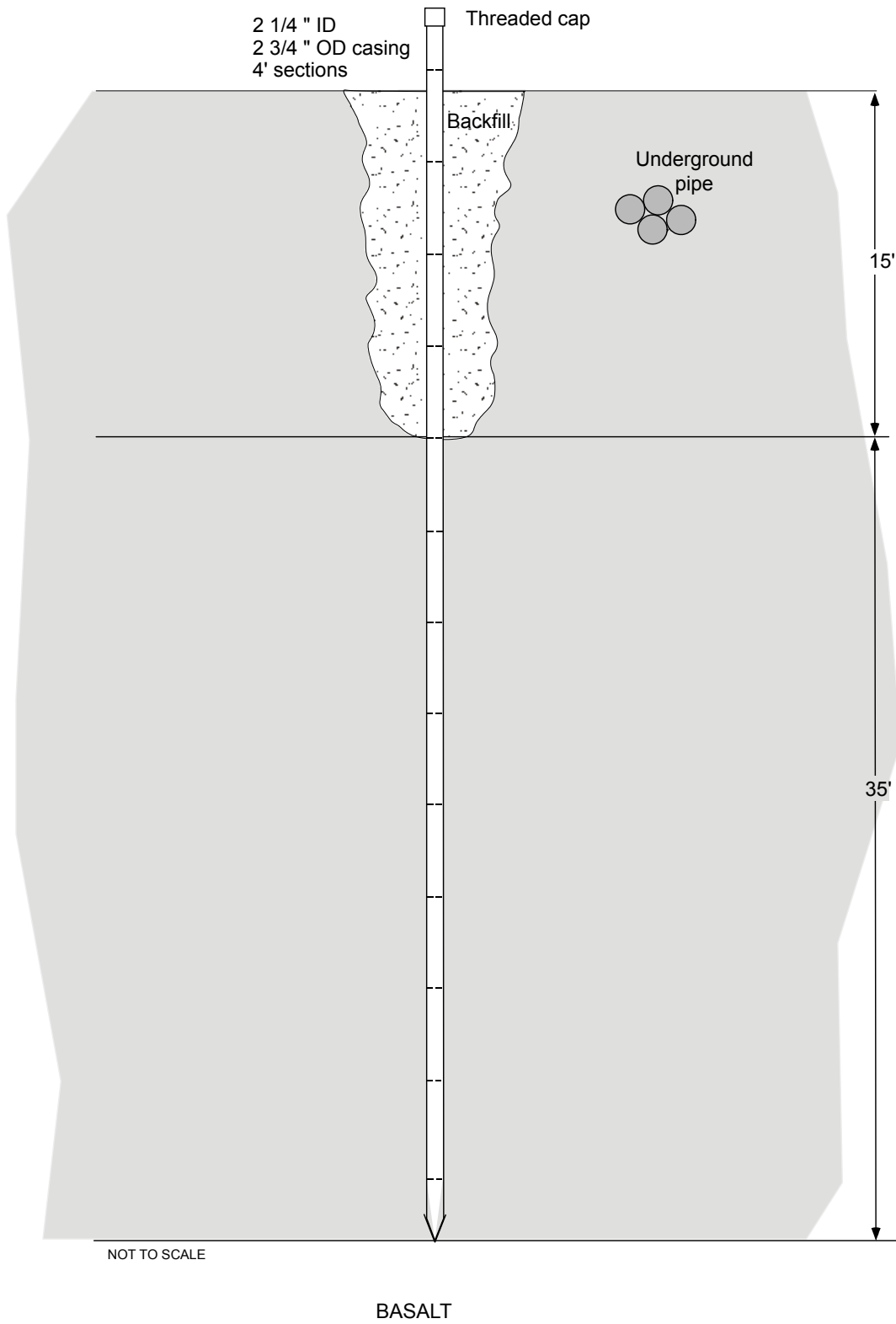


Figure 4-3. Schematic of probehole installation.

Pilot holes will extend from ground surface to approximately 4.5 m (15 ft) bls to safely penetrate through soil and avoid Tank Farm piping or other obstructions associated with past and present Tank Farm operations. Prior to any excavation, the proposed locations will be surveyed, staked, pre-approved by management, and verified based on drawings and historical documentation. The material will be screened for radiological contamination with a hand-held beta/gamma detector, and will be drummed and stored as investigation-derived waste (IDW) by the INTEC environmental coordinator or WAG personnel assigned to the project.

Since the vacuum excavator will be using air to remove soil from the probehole, cross contamination between probeholes should not be significant relative to the nature of the measurements (downhole gamma-ray survey) being made in the completed probeholes. The amount of contamination that can be carried from the vacuum hose and air lance should be negligible relative to the volume of soil being removed. Furthermore, plans for the probehole investigation are to generally proceed from the least contaminated areas to the most contaminated areas. If extensive contamination is identified in the air lance and associated hosing, the contaminated equipment will be discarded and new equipment used.

After successful completion of pilot holes using the vacuum excavator, steel probehole casing will be installed to the bottom of the hole as outlined in Section 4.3. Bentonite chips will be used to backfill the annulus between the casing and the probehole wall, if necessary. This procedure will permit probehole casings to be installed with minimal void space for a more accurate reading of that specific location. Probe construction techniques will be selected after the development of technical and functional requirements for this activity.

Vacuum excavation and filling the boring annulus with bentonite chips will alter the soil media characteristics within the immediate vicinity of the probehole. This disturbed upper zone (0-15 ft bls) may affect gross gamma logging measurements. The zone may be logged if it is determined that useable data are being collected. Because of the influence of the disturbed zone surrounding the probe, these measurements may not be directly comparable to sample results obtained by logging deeper, undisturbed intervals. Gross gamma results will be reviewed to determine if the information is considered representative of the soil contamination at that location. High levels of gamma activity in the upper 15 ft of the boring will tend to minimize possible error in the measurements obtained. If gamma activity in the soil is in the lower range of the minimum detection level for the instrument used (approaching 3 pCi/g Cs-137), then a larger error could be expected in the gross gamma measurements. Concerns that the logging results may be suspect due to soil vacuuming or backfilling around the casing in the upper 15 ft of the borings may limit the usability of gross gamma data obtained in the upper 15 ft of the probeholes.

4.3 Phase I Direct-Push Drilling in Tank Farm Soil

Several manufacturers produce a direct-push system capable of installing a steel probe to a depth of approximately 14.5 m (50 ft), which is the anticipated average depth to basalt at the Tank Farm. These systems use a truck-mounted power unit or power-take-off unit to power the hydraulic push system. This system is coupled with a hydraulic hammer to assist in installation by pounding on the casing. This configuration was successfully demonstrated at INTEC in 2001. The technique proved capable of rapidly installing casing to the depth of the basalt/alluvium interface (INEEL 2001). This procedure complies with the vibration limitations in place at the time of writing for Section 2.4 of "WAG 3 OU 3-14 RI/FS Tank Farm Soil Phase I Field Sampling Plan Probe Installation Technical Approach (Draft)" (INEEL 2001). This method will result in installation of the probehole casings without creating drill cuttings. This method also will allow installation of the casings without the need for containment and excessive personal protective equipment (PPE) requirements.

A direct-push rig will be used in the Tank Farm to install the additional probeholes for downhole gross gamma logging. The steel drive casing will be attached in 1.2-m (4-ft) or 1.52-m (5-ft) lengths (depending on the type of tooling used) as the probehole is advanced. The steel casing will have a minimum inside diameter (ID) of 5.72-cm (2 1/4-in), or as required for the type of gamma logging sonde that is used. Upon reaching the basalt or refusal, pushing/hammering will cease and the casing will be detached from the rig at the lowest possible position to maintain an aboveground completion. Exceptions may be made in specific areas determined by Tank Farm personnel, as some probeholes may be completed at ground surface. The casing will be capped with an all-weather cap to prevent entry of unwanted materials. All boring locations will be surveyed to establish exact locations.

The direct-push rig will be surveyed by the radiological control technician (RCT) using a hand-held radiation detection monitor (Ludlum 2a or equivalent), and smears will be collected, if deemed necessary by the RCT. If no contamination is detected, the rig will be moved to the next probehole location. If contamination is found, attempts to remove the contamination using dry decontamination (or other decontamination methods stipulated by the RCT) will be performed. When the rig is connected to the next probehole casing, the installation procedure will be repeated.

If a boring cannot be completed to basalt, written documentation will be provided explaining why moving the probehole location is necessary. If the probehole cannot be completed in the revised location, an entry will be made in the logbook and will serve as formal documentation. The Agencies will be subsequently notified. The casing will not be removed from the Tank Farm soil because of possible radiation exposure to workers and the environment. Rather, it will be capped and left in place.

Nine Phase I probeholes will be installed

4.3.1 Direct-Push Equipment

Probehole casings will be installed using direct-push technology. No direct-push or sampling equipment, other than the probehole casing, will come in contact with the soil. Careful use of the equipment will ensure that no releases of contamination occur to the environment, and that all activities will be conducted in accordance with appropriate management control procedures (MCPs). The subcontractor supplying the direct-equipment will work with INEEL radiological engineers and Tank Farm facility engineers to carry out the following activities:

- Modify existing subcontractor-owned equipment. INEEL and subcontractor personnel will design and manufacture the necessary equipment to provide radiation protection for personnel working with and around the direct-push equipment. This will include all direct-push and handling tools and equipment to transfer any soil cuttings from the probehole to the drums.
- Design, modify, or retrofit subcontractor-owned equipment to minimize cuttings. All aspects of this project will keep waste production to a minimum.
- Design, modify, or retrofit subcontractor-owned equipment so that it can be maneuvered to fit within the limited pushing locations while providing maximum working space for personnel.
- Design platforms or structures for steep berm or ditch locations so that pushing and sampling equipment can accomplish the sampling.
- Design, modify, and manufacture or retrofit subcontractor-owned pushing and sampling equipment to meet the Tank Farm weight restrictions identified in the “WAG 3 OU 3-14 RI/FS Tank Farm Soil Phase I Field Sampling Plan Probe Installation Technical Approach (Draft)” (INEEL 2001).

- Design, modify, and manufacture, or retrofit subcontractor-owned equipment to ensure that no damage occurs to nearby underground structures.

The Tank Farm engineers will review and approve the position of the direct-push rig and the sampling location before any sampling activities are begun. Some of the pushing locations are on steep banks and may require the design and manufacture of pushing platforms that will support the direct-push rig during pushing operations. The platform design and final assembly will be reviewed, inspected, and approved by the recognized professional engineer or structural engineer, the Tank Farm engineers, and the appropriate INEEL safety personnel.

4.3.2 Direct-Probehole Installation

Probeholes shall be installed using a hydraulically-powered, direct-push probing rig (e.g., AMS PowerProbe, Geoprobe, Stratoprobe) to advance a minimum 5.72-cm (2 1/4-in.) ID [2 3/4-in. outside diameter (OD)] hollow probehole casing with a threaded drive point from the land surface to the sediment/basalt interface (see Figure 4-3). This will allow for in situ characterization of radiological contamination as indicated by gross gamma. Once the hollow probehole casing has been advanced to the sediment/basalt interface, or until refusal, the probing rig/vehicle will relocate to another probehole location. Final depths of each probehole will vary based on the depth of the sediment/basalt interface. Soil will be displaced laterally with the direct-push monitoring probehole installation, thus eliminating the accumulation of surface drill cuttings. The probeholes will be logged with an in situ (downhole) radionuclide assay system to detect gamma radiation. Gross gamma results may be used to guide installation of subsequent borings. If proposed boring locations are changed because of information obtained in the field, all required excavation clearances must be obtained prior to commencing the boring. The installation of the probes will proceed as follows:

- After vacuum excavation or hand augering to 4.6 m (15 ft) has been completed (if required) and no subsurface structures have been encountered, a minimum 5.72-cm (2 1/4-in.) ID diameter probehole casing with a threaded drive point will be installed, and direct-push will be advanced until the sediment/basalt interface is encountered. The threaded probehole casing will be advanced in 1.2-m (4-ft) or 1.52-m (5-ft) sections, depending on the tooling that is used. Real-time radiological field screening activities will be conducted as probing through the surface sediments occurs, and readings with estimated depths will be recorded in the field notes.
- Once the probehole casing has been advanced to the final depth, the drill rig will move off the probe site. If required by the RCT, contamination surveys of push-probe equipment will be performed prior to movement of the vehicle to the next location. Once the rig is approved as clean by the RCT, the rig will be set up at another probing location. All probehole casing threaded drive points will be left in place to allow access for downhole gamma radiation logging.

Immediately after installation, each probehole will be logged from bottom to top with a small diameter gross gamma sonde system (as outlined in Section 5.1) to screen for gross gamma contamination. Gross gamma results may be used to guide installations of subsequent borings.

4.4 Phase I Hand Augering

Three boreholes (ICPP-1879, ICPP-1880, and ICPP-1881) will be hand-augered using a 4-in. OD hand auger at release site CPP-32W to the top of the tank vault at approximately 6 ft bls, or these borings may be installed with the vacuum lance as appropriate. The purpose of using a hand auger at this location is to avoid any damage to the concrete vault. Upon reaching total depth, the hand auger will be removed from the hole and the steel probehole casing will be installed. The annular space between the casing and

the bore wall will be filled with bentonite chips as necessary. Soil material, including rock and debris, will be placed into a drum or similar receptacle approved by INEEL Radiological Control (RadCon). It could be expected that about 0.1 cubic feet of soil per foot of depth would be removed from a 4-in. diameter boring. Alternatively, the three borings that will be over the tank vault may be completed using the vacuum-lance system.

4.5 Phase II Soil Sampling

This section outlines the soil sampling procedure using direct-push equipment, field decontamination procedures, and sample packaging requirements for completion of Phase II soil sampling.

4.5.1 Soil Sampling Procedure

Soil samples will be collected as part of the Phase II investigation to identify the composition of contaminants at release sites requiring further investigation (Table 4-2). The COPCs to be analyzed for at release sites CPP-15, CPP-28, CPP-31, and CPP-79 Deep are listed in Table 5-1. Analytical methods and laboratory requirements are discussed in Section 5.2. Specific sample locations and depth intervals at each release site will be determined upon completion of the Phase I investigation based on extent and distribution of radionuclide contamination. It is anticipated that the soil samples will be collected immediately adjacent to the probeholes installed during Phase I. The results obtained from the gross gamma logging of the Phase I probeholes will be used to determine the locations at which soil samples should be collected. Soil samples will be collected at those locations in four ft intervals from ground surface to basalt, resulting in about 10 sample intervals per location. An SAP table will be produced as an addendum to this FSP upon completion of the Phase I field activities designating sample locations, required analyses, QA/QC requirements, and analytical laboratory requirements. The final SAP table will be developed following identification and procurement of analytical laboratory services that will support the project.

Table 4-2. Investigation strategy for release sites requiring Phase II soil sampling.

Release Site	Investigation Strategy
CPP-15	Determine composition of contamination.
CPP-28	Determine composition of contamination.
CPP-31	Determine composition of contamination.
CPP-79 Deep	Determine composition of contamination.

A direct-push rig with a dual-tube sampling system will be used in order to minimize cross-contamination and to maximize sample integrity and recovery rate. One set of rods is driven into the ground as an outer casing. These rods receive driving force from the hammer and provide a sealed hole from which soil samples may be recovered without the threat of cross-contamination. The second, smaller set of rods is placed inside the outer casing. The smaller rods hold a sample liner in place as the outer casing is driven down one sampling interval. The small rods are then retracted to retrieve the filled liner while the outer rods are left in place. After any needed decontamination, the sampling tool and inner rods can then be reinstalled down the center of the drive casing, and sampling can continue to the next sampling interval.

The dual-tube sampling system is recommended in sandy or loamy soils where the borehole might collapse. The outer tubing acts as a support for the borehole and allows the soil sample to be collected without the risk of inadvertently collecting soil from shallower depths that fell into the open

borehole. The dual-tube soil sampling system is also recommended for use in highly contaminated soils. The outer tube prevents cross-contamination of a soil sample with material from other depths.

RadCon will survey samples using a hand-held instrument (Ludlum 2A or equivalent) as they are withdrawn from the boring. Specifications regarding handling of soil samples at various contact radiation levels (i.e., opening sample liners, transferring soil from the liner to sample bottles, storage of samples) will be addressed in a radiological work permit (RWP) and in an “as low as reasonably achievable” (ALARA) review. These documents will be developed prior to commencing field activities.

All samples will be contained in pre-cleaned and laboratory-certified bottles provided by the laboratory and prepared in accordance with EPA bottle-washing procedures and preservation requirements. All samples will be properly preserved and stored until they are shipped to the appropriate analytical laboratory per requirements outlined in the QAPjP (DOE-ID 2002), RWP, and ALARA review. If the radioactivity present in the soil samples is such that handling must be minimized, then the soil samples will be left in the sample liner. The samples will be collected by cutting the sample liner into lengths containing the required amount of soil, capping the ends of the sections of core tube, labeling the core section appropriately, and delivering the sample to the lab.

All sampling locations will be surveyed to establish exact locations.

4.5.2 Quality Control Samples

Specifics regarding type and number of QC samples to be collected during the soil sampling field exercise are outlined in Section 3.3 of this FSP. Final QC sample requirements will be included in a SAP table to be prepared upon completion of Phase I activities as an addendum to this FSP.

Duplicate samples will be collected according to specifications outlined in the RWP and the ALARA review.

Equipment rinsate samples will be collected by pouring analyte-free water over the decontaminated sampling equipment and then into the appropriate sample containers. Measures will be taken to follow established procedures as discussed in the RWP and ALARA review.

Field blanks will be collected by pouring analyte-free water into the appropriate 40-ml vials while actually at the sampling location.

4.5.3 Field Decontamination Procedures

Field decontamination procedures have been designed to prevent cross-contamination between locations and samples and to prevent offsite contaminant migration. Equipment associated with soil sampling will be thoroughly decontaminated prior to initial use and between sample locations. Rinsate QC samples will be collected as specified in an SAP table to be prepared upon completion of Phase I activities as an addendum to this FSP. Following decontamination, sampling equipment will be wrapped in foil to prevent contamination from windblown dust. Wet wipes, brushes, and steam cleaners may be used for decontamination.

Due to the nature of the radionuclide contamination in the subsurface, it is likely that new tooling will be used at each sampling location. All used tooling will be treated as IDW and managed according to the “Waste Management Plan for Operable Unit 3-14 Soil and Groundwater Remedial Investigation/Feasibility Study (Draft)” (INEEL 2003b). All unused sample material will be stored in a

35- or 55-gallon steel drum and treated as IDW. Decontamination procedures will follow established procedures as discussed in the RWP and ALARA review.

4.5.4 Sample Screening, Packaging and Shipping

All samples collected from radiologically contaminated areas will be field-screened for external contamination by the RCT prior to being released from the project work site. The RCT will determine if samples meet the release criteria as documented in the radiological work permit. In accordance with U.S. Department of Transportation (DOT) regulations and current company policies, a company-certified hazardous materials shipper will transfer all hazardous materials.

Sample packaging requirements and sample shipping requirements will be determined by RadCon and will be based on the activity observed for the samples and on the INTEC laboratory sample-receiving requirements.

4.6 Phase II Sample Collection for Treatability Studies

Samples may be collected and archived for possible use in treatability studies to support the FS analysis of remedial alternatives. If necessary, a second continuous core will be collected adjacent to the first Phase II corehole for treatability study samples. Each 4-ft Lexan liner containing core will be collected, capped, labeled, and archived in a labeled PVC tube with threaded end caps. These samples will be stored at a location to be determined until the need for treatability studies is assessed. If the studies are not needed, the samples will be dispositioned as IDW.

5. MEASUREMENT METHODS

This section outlines in detail the methods to be followed for completion of the Phase I subsurface gross gamma radiation logging and analytical methods for Phase II soil sampling.

5.1 Phase I Subsurface Gross Gamma Radiation Logging

Subsurface radiation logging will be conducted using a downhole high-density Bismuth Germanium Oxide (BGO) gamma detector logging tool. The gamma-ray logging tool will be operated in move-stop-acquire mode to detect and record gross gamma radiation flux with depth. The suggested depth increment is 0.15 m (0.5 ft) along the probe hole length. Gross gamma is recorded at each depth increment at 100 counts per second for 10 seconds (this constitutes a logging time of 3 feet per minute under normal conditions). This will achieve a minimum detection level for Cs-137 of 3 pCi/g. The depth position recorded with each survey interval is measured from ground surface. The OD of the logging tool is 41.9 mm (1.65 in.) and the length of the tool is less than 760 mm (30 in.).

Log surveys are examined to locate areas of subsurface contamination. Correlation between log plots will be used as a basis to estimate the combined horizontal and vertical extent of continuous contamination zones.

5.1.1 Site Survey

The subsurface radiation-logging subcontractor shall find and mark borehole locations using Figures 4-1 through 4-3 as guides. Boreholes shall be flagged with appropriate markers that include the borehole name. The flagged location shall be surveyed to obtain coordinates for each borehole. These coordinates shall be referenced to the project-specific coordinate system. In general, the gamma logging will be conducted in each of the new probeholes immediately after completion of each boring. Information thus obtained may be used to guide subsequent boring installations.

5.1.2 Mobilize Survey Instrument

Since Cs-137 is historically known to have been present in each of the Tank Farm release sites, it can be used as an indicator to find other contaminants. Therefore, the logging instrument was chosen specifically for detection of Cs-137 gamma rays (0.662 MeV). Subsurface radiation logging shall use a field-portable gamma-ray radiation logging system with the following minimum specifications:

- Energy sensitivity maximum: 2600 keV
- Measurement mode: move-stop-acquire mode
- Tool diameter: 41.9 mm (1.65-in.) OD.

5.1.3 Calibrate Instrument

The gamma ray probe is calibrated in accordance with industry-recognized procedures in certified borehole calibration models. A section of the driven probe rod is assembled over the logging sonde during calibration. Calibration in this configuration incorporates the casing thickness correction since the probe wall thickness is included in the calibration. This method of calibration is more rigorous than applying a casing thickness correction separately during data analysis.

5.1.4 Conduct Field Survey

A downhole gross gamma radiation survey will be performed in selected existing and all new probeholes (Figures 4-1 through 4-3). Survey measurements shall be obtained at a maximum depth interval of 0.15 m (0.5 ft), beginning at the lowest depth obtainable in each borehole and continuing upward to within 0.31 m (1 ft) of the ground surface. Gamma logging operations will be performed according to the manufacturer's specifications and approved procedures as discussed above.

Regular field verification will be performed to ensure that the gamma survey instrument operates consistently during the course of the downhole-logging program. The field verification procedure shall be documented in the subsurface radiation logging subcontractor work procedure. Real-time review of the results will be possible in the field with this logging system. The data shall also be backed up separately from the field laptop computer.

Historically, the presence of water has been noted in some of the existing boreholes. A water level measurement will be taken before logging these boreholes. If water is found, the logging probe will be sleeved to preclude decontamination measures, or the subsurface radiation-logging subcontractor may choose not to log that hole. The RCT will monitor the equipment according to existing subsurface radiation logging subcontractor procedures. Smears will be taken before the tool is moved to the next logging location. If required, the subsurface radiation-logging subcontractor shall perform all decontamination procedures. The procedure will be in accordance with this FSP and Standard Operating Procedure (SOP)-11.5, "Field Decontamination of Sampling Equipment."

5.1.5 Processing, Analysis, and Final Report

The raw data from the field instrument will be downloaded on a daily basis. Raw data shall be processed as necessary to produce final data sets, which for each data point shall include well name, depth, and instrument gross gamma-ray reading in counts/sec. A written report will be prepared containing the following:

- Description of field activities
- Description of equipment
- Instrument calibration documentation
- Results including gamma-ray radiation log plots
- Interpretation and recommendations.

5.2 Laboratory Analytical Methods for Phase II Soil Samples

This section outlines the laboratory analytical methods to be followed for analyzing soil samples collected at the Tank Farm. Table 5-1 indicates the COPCs that will be analyzed for, at the release sites.

5.2.1 Analytical methods and procedures

Definitive level data are required for this project. Samples shall be analyzed as specified in the QAPjP (DOE-ID-2002). The COPCs to be analyzed for at the release sites are listed in Table 5-1. Table 5-1 also lists the analytical procedures that will be used. Sample containers, preservatives, minimum volumes, and holding times are listed in Table 5-2.

Table 5-1. Contaminants of potential concern to be analyzed for and required analytical methods.

Discipline	Analyte	Method
Radionuclides	Am-241	Alpha Spec or Gamma Spec
	Pu-238	Alpha Spec
	Pu-239/240	Alpha Spec
	U-233/234	Alpha Spec
	U-235	Alpha Spec or Gamma Spec
	U-238	Alpha Spec
	Np-237	Alpha Spec
	Tritium	Liquid Scintillation Counter
	Tc-99	Liquid Scintillation Counter
	Sr-90	Gas Proportional Counter
	Carbon-14	Gas Proportional Counter
	I-129	Gas Proportional Counter or Gamma
	Cs-137	Gamma Spec
	Eu-154	Gamma Spec
Inorganics	Arsenic	SW-846 ^a 7000A ^b or 7062 ^c
	Chromium	SW-846 6010/6010B ^d
	Mercury	SW-846 7470A ^e (aqueous) or 7471A ^f (non-aqueous)
Wet Chemistry	Nitrate	EPA-300.0 ^g , 352.1 ^h , 353.1 ⁱ , or 353.2 ^j
	Nitrite	EPA-300.0 ^g , 352.1 ^h , 353.1 ⁱ , or 353.2 ^j
Organics	Appendix IX TAL-VOCs	SW-846 8260B ^k
	Appendix IX TAL-SVOCs	SW-846 8270C ^l
TCLP	Metals and organics	SW-846 1311 ^m

SVOC = semivolatile organic compound

TAL = target analyte list

TCLP = toxicity characteristic leaching procedure

VOC = volatile organic compound

a. All SW-846 methods cited in this table are extracted from "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods" (EPA 2003).

b. SW-846, Method 7000A, "Atomic Absorption Methods"

c. SW-846, Method 7062, "Antimony and Arsenic (Atomic Absorption, Borohydride Reduction)"

d. SW-846, Method 6010/6010B, "Inductively Coupled Plasma-Atomic Emission Spectrometry"

e. SW-846, Method 7470A, "Mercury in Liquid Waste (Manual Cold-Vapor Technique)"

f. SW-846, Method 7471A, "Mercury in Solid or Semisolid Waste (Manual Cold-Vapor Technique)"

g. EPA Method 300.0, "Determination of Inorganic Anions by Ion Chromatography" (EPA 1993)

h. EPA Method 352.1, "Nitrate (Colorimetric, Brucine)" (EPA 1983)

i. EPA Method 353.1, "Nitrate-Nitrite (Colorimetric, Automated Hydrazine Reduction)" (EPA 1983)

j. EPA Method 353.2, "Nitrate-Nitrite (Colorimetric, Automated Cadmium Reduction)" (EPA 1983)

k. SW-846, Method 8260B, "Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry"

l. SW-846, Method 8270C, "Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry"

m. SW-846, Method 1311, "Toxicity Characteristic Leaching Procedure"

Table 5-2. Sample containers, preservation, minimum volume, and holding time requirements.

Analyte	Preservative	Minimum Volume	Container	Holding Time
Radionuclides				
Am-241	None	5 grams	16 oz squat jar	180 days
Pu-238, 239/240	None	5 grams	16 oz squat jar	180 days
U-233/234,235,238	None	5 grams	16 oz squat jar	180 days
Np-237	None	5 grams	16 oz squat jar	180 days
Tritium	4°C	5 grams	16 oz squat jar	180 days
Tc-99	None	5 grams	16 oz squat jar	180 days
Sr-90	None	1 gram	16 oz squat jar	180 days
Carbon-14	None	5 grams	16 oz squat jar	180 days
I-129	4°C	15 grams	16 oz squat jar	28 days
Gamma Spec	None	150 grams	16 oz squat jar	180 days
Inorganics				
Metals (CLP TAL)	4°C	20 grams	30 mL G or P	180d;28dHg
Wet Chemistry				
Nitrate	4°C	50 grams	60 mL AG or P	48 hours
Nitrite	4°C	50 grams	60 mL AG or P	48 hours
VOCs				
Appendix IX VOCs	4°C	60 grams	120 mL WMG	14 days
SVOCs				
Appendix IX SVOCs	4°C	90 grams	250 mL WMG	14 days
TCLP				
Metals and Organics	4°C	100 grams	250 mL WMG	14 days
AG = amber glass CLP = Contract Laboratory Program G = glass P = plastic SVOC = semivolatile organic compound TAL = target analyte list VOC = volatile organic compound WMG = wide-mouth glass				

6. PERSONAL PROTECTIVE EQUIPMENT, EQUIPMENT DECONTAMINATION, AND WASTE MANAGEMENT PROCEDURES

This section describes the personal protective equipment (PPE), equipment decontamination, and waste management procedures required for this field effort. Before any sampling activities begin, a prejob briefing will be held to review the requirements of the FSP, HASP (INEEL 2003a), and other work controlling documentation, and to verify that all supporting documentation has been completed. In addition, at the termination of the sampling activities, a post-job review will be conducted in accordance with MCP-3003, "Performing Pre-Job Briefings and Documenting Feedback."

6.1 Personal Protective Equipment

The PPE required for this sampling effort is discussed in the HASP (INEEL 2003a).

Before disposal of used PPE, a hazardous waste determination will be completed by means of the requirements set forth in MCP-62, "Waste Generator Services—Low-Level Waste Management."

6.2 Direct-Push and Hand Augering Equipment

All direct-push and hand-augering equipment will be steam-cleaned before the Tank Farm area is entered. Decontamination of direct-push equipment between probeholes is unnecessary as the probe and steel casing will remain in the ground.

The decontamination methods for the direct-push and hand-augering equipment will ensure containment of all decontamination fluids, minimize waste, and minimize contamination of equipment. Decontamination of the field equipment will be performed per SOP-11.4, "Field Decontamination of Heavy Equipment, Drill Rigs, and Drilling Equipment," and SOP-11.5, "Field Decontamination of Sampling Equipment." In addition, evaluation of decontamination measures will be made during the field demonstration. Modifications also will be made, if necessary, to ensure that containment, proper waste segregation, and waste minimization procedures will be in place prior to the start of field activities inside the Tank Farm.

6.3 Vacuum Excavation Equipment

Samples will be surveyed for external contamination and radiation levels after sample collection and before packaging for shipment. The shipping container also will be surveyed for external contamination and radiation levels before removal from the sampling area. Radiological Control stickers indicating the survey results will be placed on each container. Removal of containers from the sampling area will be under the discretion of Radiological Control Technicians (RCTs).

A sample will be sent to the INTEC laboratory for a 20-minute gamma screening if determined to be necessary by RadCon. Results of the screening and process knowledge will be used to scale alpha and beta isotopes in relation to gamma activity, and the total activity will be calculated to ensure that the shipment does not exceed the 70 Bq/g DOT limit as provided under 49 CFR, "Transportation."

6.4 Management of Sampling Waste

The IDW waste generated during the OU 3-14 field investigation may include the following items:

- Contaminated PPE, wipes, bags, and other paper and plastic trash
- Contaminated direct-push drilling and sampling equipment
- Aqueous decontamination solutions
- Unused, unaltered, and altered sample material
- Used sample containers and disposable sampling equipment
- Metal and wood debris (temporary push drilling platforms)
- Vacuum extracted soils
- Aqueous and liquid organic analytical waste
- Used soil drums.

The disposition and handling of waste for this project will be consistent with the “Waste Management Plan for Operable Unit 3-14 Soil and Groundwater Remedial Investigation/Feasibility Study (Draft)” (INEEL 2003b). Samples will be handled in accordance with MCP-3480, “Environmental Instructions for Facilities Processes, Materials and Equipment”; and Program Requirements Document (PRD)-5030, “Environmental Requirements for Facilities, Processes, Materials and Equipment.” All waste streams generated from the project will be characterized in accordance with this FSP or MCP-63, “Waste Generator Services - Industrial Waste Management,” and will be dispositioned accordingly.

6.4.1 Waste Management

The following items will be covered in the Waste Management Plan (INEEL 2003b):

- Hazardous waste determination
- Waste minimization and segregation
- On-Site waste management requirements
- Waste management and final disposal.

7. DOCUMENT MANAGEMENT AND SAMPLE CONTROL

Section 7.1 summarizes document management and sample control. Documentation includes field logbooks used to record field data and sampling procedures, chain of custody (COC) forms, and sample container labels. Section 7.2 outlines sample handling and discusses COC, radioactivity screening, and sample packaging for shipment to the analytical laboratories. Section 7.3 references the procedure to be used for revising this document.

7.1 Documentation

The FTL will be responsible for controlling and maintaining all field documents and records, and for verifying that all required documents will be submitted to the INEEL Idaho Completion Project (ICP) Administrative Records and Document Control (ARDC). All entries will be made in indelible black ink. Drawing a single line through the error and entering the correct information will correct errors. All corrections will be initialed and dated.

7.1.1 Sample Container Labels

Waterproof, gummed labels generated from the SAP database will display information such as the unique sample ID number, the name of the project, sample location, and analysis type. Labels will be completed and placed on the containers in the field before sample collection. Information necessary for label completion will include sample date, time, preservative used, field measurements of hazards, and the sampler's initials.

7.1.2 Field Guidance Form

Field guidance forms verifying unique sample numbers provided for each sample location will be generated from the SAP database. These forms contain the following information:

- Media
- Sample ID numbers
- Sample location
- Aliquot ID
- Analysis type
- Container size and type
- Sample preservation.

7.1.3 Field Logbooks

Field logbooks will be used to record information necessary to interpret the analytical data in accordance with ARDC format, and will be controlled and managed according to MCP-1194, "Logbook Practices for ER and D&D&D Projects."

7.1.3.1 Sample Logbooks. The field teams will use sample logbooks. Each sample logbook will contain the following information:

- Physical measurements
- All QC samples
- Sample information (sample location, analyses requested for each sample, sample matrix)
- Shipping information (collection dates, shipping dates, cooler ID number, destination, COC number, name of shipper).

7.1.3.2 Field Team Leader's Daily Logbook. A project logbook maintained by the FTL will contain a daily chronological summary of the following items:

- All field team activities, including locations worked at
- List of site contacts
- Problems encountered.

This logbook will be signed and dated by the FTL at the end of each day's sampling activities.

7.1.3.3 Site Attendance Logbook. A project logbook maintained by the FTL will contain a daily summary of:

- Names of field personnel at the job site
- Company affiliation
- Time of entry into and exiting the job site.

7.1.3.4 Field Instrument Calibration/Standardization Logbook. A logbook containing records of calibration data will be maintained for each piece of equipment requiring periodic calibration or standardization. This logbook will contain logsheets to record the date, time, method of calibration, and instrument ID number. Calibration will be performed in accordance with MCP-2391, "Control of Measuring and Test Equipment."

7.2 Sample Handling

Analytical samples for laboratory analyses will be collected in precleaned, laboratory-certified containers and packaged according to the American Society for Testing and Materials, or EPA-recommended procedures. The QA samples will be included to satisfy the QA/QC requirements for the field operation as outlined in the QAPjP (DOE-ID 2002). Qualified (Sample and Analysis Management-approved) analytical and testing laboratories will analyze the samples.

7.2.1 Sample Preservation

Soil samples will be preserved immediately upon sample collection in accordance with the requirements in the QAPjP (DOE-ID 2002). All soil, rinsate, and QA/QC samples will be placed in coolers containing frozen, reusable ice immediately after sample collection and survey by RadCon.

According to the QAPjP, samples will be maintained at 4°C and preserved immediately after sample collection, as specified in Table 5-2.

7.2.2 Chain of Custody Procedures

The chain of custody procedures will be followed in accordance with the QAPjP and MCP-3480, “Environmental Instructions for Facilities Processes, Materials and Equipment”; and PRD-5030, “Environmental Requirements for Facilities, Processes, Materials and Equipment.” Sample containers will be stored in a secured area accessible only to the field team members.

7.2.3 Transportation of Samples

Samples will be shipped in accordance with the regulations issued by the DOT (49 CFR Parts 171 through 178) and EPA sample handling, packaging and shipping methods (40 CFR 262.30). Samples will be packaged in accordance with the requirements set forth in MCP-3480 and PRD-5030.

7.2.3.1 Custody Seals. Custody seals will be placed on all shipping containers in such a way as to ensure that sample integrity is not compromised by tampering or unauthorized opening. The seals will be signed by a member of the field team. Clear, plastic tape will be placed over the seals and the signature to ensure that the seals are not damaged during shipment.

7.2.3.2 On-Site and Off-Site Shipping. An on-Site shipment is any transfer of material within the perimeter of the INEEL. All materials to be shipped on-Site or off-Site will be properly characterized in compliance with DOT requirements under pertinent Department of Energy orders and 49 CFR 173.2, “Hazardous Materials Classes and Index to Hazardous Class Definitions.” All shipping containers and related papers and manifests will have the proper shipping names as provided under 49 CFR 172.101, “Purpose and Use of Hazardous Materials Table.” Site-specific requirements for transporting samples within INEEL boundaries and those required by the shipping and receiving department will be followed. Shipment within INEEL boundaries will conform to DOT requirements as stated in 49 CFR, “Transportation.” Off-Site sample shipment will be coordinated with INEEL Packaging and Transportation personnel as necessary, and will conform to all applicable DOT requirements.

7.2.3.3 Nuclear Material Control and Accountability. The past sampling and analysis results for soil samples collected in the Tank Farm indicate that a potential exists for exceeding the minimum reporting quantities specified in PRD-170 and PDD-103, “Nuclear Material Control and Accountability and Nuclear Materials Management.” Transfers of accountable nuclear material to, from, and within the INEEL must be controlled and monitored. Instructions for shipment and receipts of nuclear materials are provided in MCP-2752, “Shipments and Receipts of Nuclear Material.” If required, these will be adhered to through coordination with the appropriate Nuclear Material Custodians and with Packaging and Transportation personnel.

7.3 Document Action Requests

Revisions to this document will follow INEEL MCP-233, “Process for Developing, Releasing, and Distributing ER Documents.”

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Appendix A

Operable Unit 3-14 Release Sites with Existing and Proposed Probehole Locations

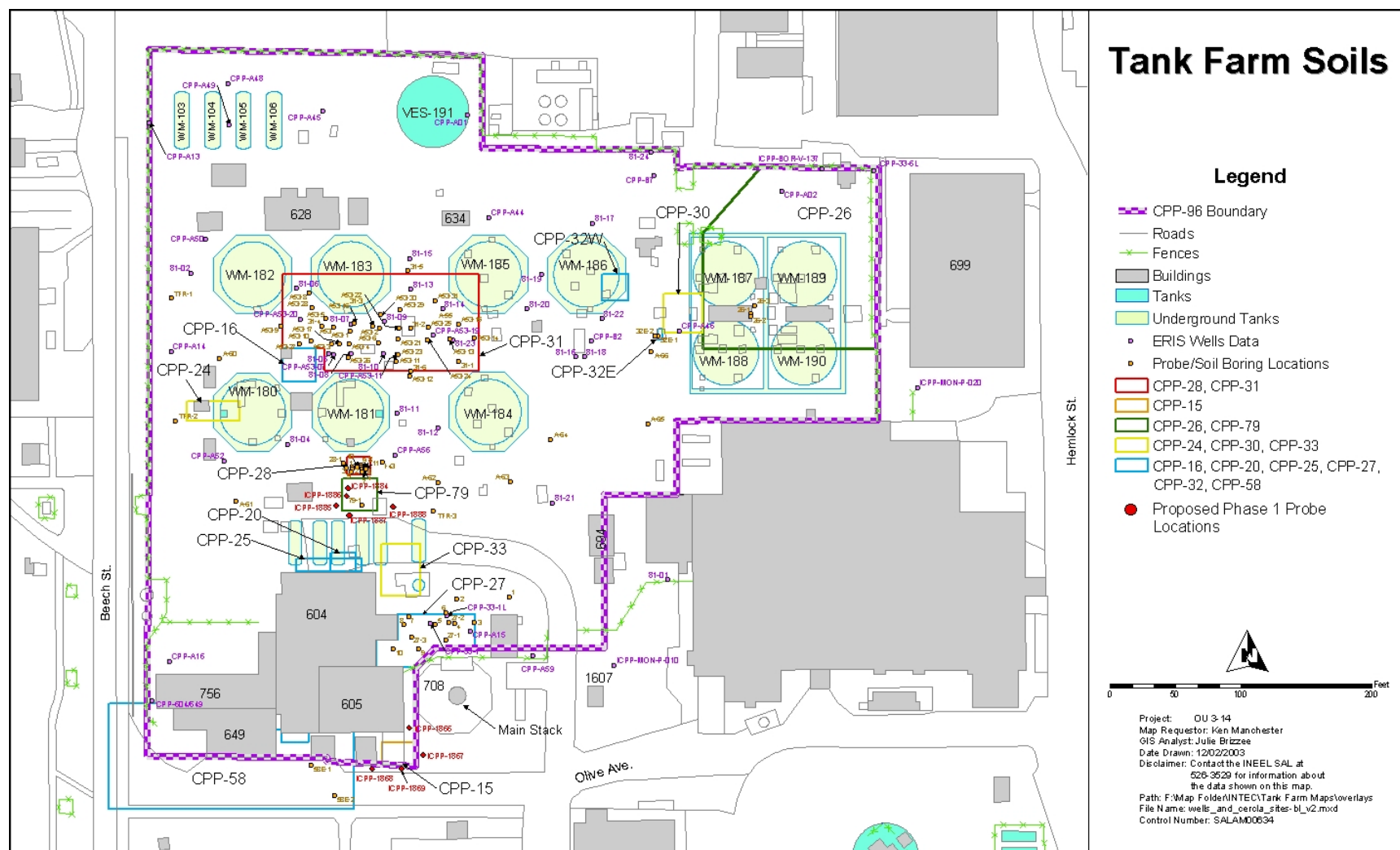


Figure A-1. Operable Unit 3-14 release sites with existing and proposed probehole locations.

